

# Summary and Achievements of City Atlases in China

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**Abstract.** This paper summarizes the achievements of city atlases in P. R. China. First of all, the importance of city atlases has been recognized year after year since the course of urbanization in P.R. China, and attention to edit & produce city atlases has been paid intensively and extensively, not only in terms of personnel investment and financial support, but also regarding to sponsors and investors. Secondly, contents and structures of Chinese city atlases changed remarkably in the past 30 years. Not only a snapshot, but also the whole history of cities, from far ancient time to current situation, are described in recent years city atlases, and editing comprehensive city atlases, other than singly thematic ones, appears in the new city atlases in China. Furthermore, more and more cities are concerning to excavate their exclusive features, on city atlases to build up their city name-card. Thirdly, functions of city atlases were enhanced obviously, i.e., from propagation & education to scientific reference & decision support, from narrow fields to four types of users, from summary products to intelligent tools. Fourthly, diversified source of data is integrated and utilized in the newly edited city atlases, since data owners are getting more and more compromised from isolation to cooperation, and key projects of China such as CNSDI, Digital China, lead to data integration of city atlases. Fifthly, colorful and powerful visualization was realized in recent edited city atlases, e.g. '2D+3D+image' or painting on printed city atlases, multi-media and virtual reality on electronic city atlases. Sixthly, technologies of editing and producing city atlases were improved and optimized, e.g. GIS driven technologies, and other high-tech points such as augmented reality have been integrated into city atlases. Seventhly, application regions of city atlases were expanded gradually, from key large cities to medium & small cities, and from developed regions to backward ones.

**Key words:** City Atlas; Contents and Structures; Functions; Data Integration; Visualization; Technologies; Application Regions

## 1. Importance Recognized and Attentions Paid

The importance of city atlases has been recognized year after year since the course of urbanization in P.R. China, because city atlases are more and more broadly regarded as important media of presentation, ways of propagation and advertisement, and tools of analysis & decision support for various cities' features, cultures, developing achievements. For instance, unique street of living, eco-environment, and administrative regionalization are described in the atlases of China's municipality directly under the Central Government, such as Beijing, Shanghai, Tianjin, etc.

In this context, the attention to edit & produce city atlases has been paid intensively and extensively, not only in terms of personnel investment and financial support, but

also regarding to sponsors and investors. More and more sponsors and investors for city atlases from enterprises come, in addition to government offices and functional departments & agencies.

In a word, centralized support is being replaced by decentralized parts in more ratios.

## **2. Contents and structures change remarkably**

### **2.1 Snapshot VS. span of history**

The status of cities in a short period or one time snapshot was mainly displayed in China's city atlases 30 years ago. For example, the *Atlas of Beijing Tourism* published in 1987 only reflected the tourism resources, sightseeing spots, transportation lines and accommodations in that time, can be regarded as a snapshot.

In recent years, covering the whole history of cities, from far ancient time to current situation, has been one of the tendencies, in order to reflect the denseness of each city's glorious history, especially to express its historical influence to modern time, and to search ancient incidents and relic for tourism resources, is emphasized. Samples can be found in the historical atlases of several cities such as Beijing, Wuhan, Shanghai, Tianjin. The *Historical Atlas of Beijing City* displayed not only the culture of stone age of Beijing, the agriculture generation in Beijing area, but also their functions in current tourism, i.e., ancient cultural relics as sightseeing spots. Also in the *Historical Atlas of Wuhan City* and *Historical Atlas of Tianjin City*, ancient maps of Wuhan city, ancient maps of *Tianjin Port* and *Haihe River*, and their comparison with the same sections of modern city are notably presented. In the *Historical Atlas of Shanghai City*, series of maps of physical figure and administration shape of each dynasty since 2000 years ago were shown, reflecting the span of history of the city.

### **2.2 Thematic VS. comprehensive**

On traditional city atlases of China, natural geographical, human geographical or urban construction themes were described independently, or in way of thematic map.

In new city atlas, relationship of natural, socio-economic and eco-environment was lay stress on, such as the maps of 'Leading Functional Region', the maps of 'Regional Harmonious Degree', and the maps of 'Emergency Reaction', etc. These comprehensive atlases obviously excavate city atlas' thematic and comprehensive combined functions, and will play more and more substantial role in city construction and city development.

### **2.3 Important events and city name-card**

More and more cities are concerning to excavate their exclusive features, physical, historical, commercial, or modernizational, on city atlases to build up their city name-card, for example, the city of Jiayuguan is known as the west end of the Great Wall, while the city of Yan'an is known as the center of revolutionary basement area during the *Anti-Japanese War*, etc.

Furthermore, some cities also edit & produce their atlases according to important events occurred at them or in close relationship with them, because they were much more famous owing to those incidents, e.g. Beijing Olympic Games (2008), Shanghai Expo Exhibition (2010), and the Three Gorge Project in Chongqing City, and the National Games of China in some cities. Taking the *Atlas of Shanghai Municipality (Expo Version)* as an example, the expo exhibition was the key high-light, therefore it was described in detail, including the overview, the emblem and mascot, the

participation nations, regions and organizations, the bird-view, the master plan, as well as the permanent structures and self-built pavilions, etc. of the Expo 2010', Shanghai.

### **3. Functions Enhanced Obviously**

#### **3.1 From normal functions to Scientific Reference & Decision Support**

City atlases were edited mainly for information dissemination and status education in the 1980s in China, i.e., those city atlases were majorly used for government propagation, and education in primary, middle schools and university.

Nowadays, in addition to the above two functions, city atlases are oriented to scientific reference and decision support, and situation analysis and emergency reacting are other two functions currently and in future. Much more thematic and comprehensive atlases, based on scientific research achievements, are becoming the focus of current city atlases.

#### **3.2 From Narrow Fields to Four Types of Users**

Typically, China's city atlases are designed for users in relatively narrow field, e.g. government officials, agencies, etc.

Current city atlases in China are produced for four types of users, i.e., governmental functional departments and agencies, scientific research institutes, enterprises, and the masses. What is more, enterprise and masses users are paid much more attention to, because they reflect multi-level need in market economy and modern society.

#### **3.3 From Summary Products to Intelligent Tools**

In the past 30 years, city atlases have long been regarded as information summary for situation and development of related cities. Currently, China's city atlases are evolving from presentation products to analytic ones, statistical ones and computational ones. Furthermore, navigational city atlases, even phonetic ones, bring us intelligent location-based service.

### **4. Diversified Source of Data Integrated and Utilized**

#### **4.1 From Isolation to Cooperation: Data owners Compromise**

Agencies of surveying & mapping, construction and social-economic management has long been three main city data owners in China, therefore were major city atlas sponsors and supporters. So information isolation was unavoidable in the edition and production of city atlases.

In recent ten years or so, exciting changes happened when the above three data owners collaborate in the planning, designing, compilation and publication of thematic or comprehensive city atlases.

#### **4.2 Key Projects Lead to Data Integration**

City atlases were driven and directed by a series of China's key projects in national, provincial, ministry and city level from recent years ago. So current China's city atlases are based on abundant data integration among departments & agencies of geo-informatics, land resource management, social-economic statistics, urban

planning and construction, as well as environmental protection. Therefore, information derived from several key projects, such as CNSDI, Digital China, digital provinces, digital cities, the surveying & mapping for China's western area, 2nd LUCC investigation, geologic & mineral surveying, population census, economy census, etc. are reflected in recent notable city atlases.

## **5. Colorful and Powerful Visualization Realized**

### **5.1 '2D+3D+image' or painting on printed city atlases**

Traditional printed city atlases in China are composed of mainly 2D maps, in topographic and thematic symbolic appearance.

More and more printed city atlases in China utilize modern cartographic language, such as colorful thematic symbols, 3D symbols, and '2D+3D+image' combined mode, which sufficiently enhance their presentation effect and efficiency.

Some city atlases in recent years even use traditional Chinese cultural elements, such as Chinese Painting.

### **5.2 Multi-media and virtual reality on electronic city atlases**

Several cities edit and publish CD-ROM or even internet version at same time or after the printed version.

Multi-media and virtual reality are also shown on electronic city atlases, so that maps, text, graphics, photos, sound, video are combined into mixed super-media and form self-organizing, self-navigation and self-adaptive ones.

## **6. Technologies Improved and Optimized**

### **6.1 GIS driven technologies**

In edit workflow, city atlases in China have already transmitted from purely mapping to GIS platform and database driven technologies which activate dynamic data revision, multiple-layer transparent overlay, statistics and computation.

Mathematic models are also be used as powerful tools when deriving new thematic map layers, except the approach of field work surveying, statistics, and RS image based information exaction, etc.

### **6.2 Other high-tech points will be integrated into city atlases**

City atlas compilation based on self-developed software, other than commercial ones, are realized in more and more products which tend to combine printed versions with electronic ones.

New high-tech such as Internet of Things, other than internet of men, and Augmented Reality, other than virtual reality, are tend to be used in city atlases, which are useful to urban planning, urban management and emergency reaction.

## **7. Application Regions Expanded**

### **7.1 From key large cities to medium & small cities**

City atlases began from China's municipality under central government, such as Beijing, Shanghai and Tianjin 30 years ago.

Other cities like Guangzhou, Shenzhen, Nanjing, Xi'an, Chongqing, etc. followed, which led the application tendency and spread to lots of medium & small cities, such as Zhuhai, Shaoxing, Xiaoshan or even sub-districts like Longgang of Shenzhen.

### **7.2 From developed regions to backward ones**

In terms of regions and zones, city atlases in China began from the Yangtze Delta Region, the Pearl-River Delta Region, and Beijing-Tianjin-Hebei Region.

More recently, the tide spread to China's Central zone, such as Wuhan, Changsha, etc., and even to Western zone, like Yinchuan and Jia Yuguan, which lead the popularity of city atlases to the whole country.

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